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Determining priorities of effective organizational strategies by ANP and SWOT models

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Abstract

Strengths, weaknesses, opportunities and threats (SWOT) analysis does not provide an analytical means to determine the importance of the identified factors or the ability to assess decision alternatives according to these factors. Although the analysis pinpoints the factors successfully, individual factors are usually described briefly and generally. For this reason, SWOT analysis possesses deficiencies in the measurement and evaluation steps. Although the analytic hierarchy process (AHP) technique removes these deficiencies, it does not allow for the measurement of the possible dependencies among the factors. Therefore, it is better to employ a form of SWOT analysis that measures and takes into account the possible dependencies among the factors. This paper uses the analytic network process (ANP), which allows the quantitative analysis of SWOT and measurement of the dependencies among the factors. Dependencies among the SWOT factors affect the strategic and sub-factor weights and change the strategy priorities. Aim of this research is to determine the priority of organizational strategies for using. SWOT is used for determining strategies and ANP is used for evaluating strategies. Finally, strategy of SO is selected as the best strategy for using because it has the highest weight in final matrix.

Key Word: Strategic Planning, SWOT, AHP, ANP

1. Introduction

Companies' managers should determine the way to create value to the shareholders, customers and citizens by using all organizational levels. Prior to develop strategies, managers should analyze competitive dynamic environment in the industry, company's internal resources and capabilities to achieve a clear understanding towards these strategies. So SWOT analysis is used to summarize the most important internal and external factors in the organization (this factor is known as strategic factors affecting the future of this organization). This study wants to determine alternative strategies in order to rank and select the best strategies by Analytical Hierarchy Process (ANP) method.

Many and different methods can be used for strategic analysis. The SWOT analysis is an important tool for decision support and analysis the internal and external environments of an organization (Kangas et al.

2003). SWOT analysis finds the most important internal and external factors of an organization and then summarizes them. These factors are known as effective strategic factors for the future of the organization. SWOT analysis has some shortages in measurement and evaluation process. Factors are introduced in SWOT but their importance and value is not clear to us. So we need another complementary method for the evaluation and selection of the factors. Many methods and techniques have been used so far, such as AHP method. Although AHP technique can resolve some of the shortages of assessment and measurement process, it is not able to evaluate dependency among them (Yüksel & Dağdeviren, 2007). AHP method assumes that considered factors are independent in the hierarchical structure, while this assumption is not always rational. Through the analysis of internal and external environments, possible dependencies among factors can be realized. So if there is a dependency among SWOT factors, AHP method will be invalid for calculations.

2. Theoretical Research

1.2. AHP & ANP

Analytical hierarchy process (AHP) which is a mathematical technique for multi-criteria decision making was introduced by Saaty (1980). This technique is based on pair-wise comparison matrix.

The Analytic Hierarchy Process (AHP) is a commonly used multi-criteria decision making method (Saaty, 1980). AHP performs pair-wise comparisons between factors in order to prioritize them by using the eigen-value calculation framework. The objective in utilizing the AHP within SWOT framework is to systematically evaluate SWOT factors and equate their intensities. AHP advantages; i.e., a systematic approach to take a decision about problems and commensurability, are regarded as valuable characteristics of SWOT analysis. Additional values from SWOT analysis can be achieved by performing pair-wise comparisons between SWOT factors and analyzing them by means of eigenvalue technique as applied in AHP. This offers a good basis for examining the present or anticipated situation and helps with adopting a new strategy more comprehensively (Kurttila *et al*.,2000). SWOT-AHP technique was applied in areas such as environment (Kurttile *et al*., 2000; Leskinen *et al*., 2006; Pesonen *et al*., 2000; Masozera *et al*., 2006).

ANP is a more inclusive model than AHP and allows the analysis of different issues with interactive data between elements (Saaty,2004, p.5). Also these interactive communications are sometimes called a feedback system. A method should be developed as super-matrix to calculate the weight of these issues (Saaty, 1999, p.16). The super-matrix adjusts the effect of weights associated with the elements and considers all the options and elements in a company.

The differences between two techniques from Saaty's viewpoint are: (Saaty, 1999)

- ANP with the permitting dependence goes beyond AHP which is the only independent case.
- ANP is associated with dependence of elements in one set and dependence of elements in different sets (external dependence).

- ANP network structure allows a researcher to make decisions about different issues without worrying about what comes first and what comes later.
- ANP has a non-linear structure while AHP, with a goal at the highest level and the options on the bottom level, has a linear structure.
- According to ANP both elements and cluster of elements will be arranged based on priority right.

Fig. 1 illustrates the difference between hierarchy and network structure. As shown in Fig. 1, a hierarchy is a linear top down structure and a network is a non-linear structure which spreads out in all directions.

2.2. ANP implement's process

ANP can be described according to the following steps (Chung *et al.* 2005):

Step 1: Model construction and problem formulation: The derivation of the weights for all *n* components, *Cn* regarding the dependencies in relevance to an overall criterion, which can be elicited based on expert knowledge.

Step 2: Pair-wise comparison matrices and priority vectors: decision elements at each component are compared Pair-wise with respect to their importance towards their control criterion, and the components themselves are also compared pair-wise with respect to their contribution to the goal. The relative importance values are determined by using the Saaty's (Saaty 1999) 1–9 scale (Table 1).

Step 3: Super matrix formation: the concept of super matrix is similar to the Markov chain process that Saaty has developed to synthesize ratio scales (Saaty 1999). Let the components (clusters) of a decision system be *Ch*, *h* = 1,. . . *n*, and let each component *h* have *mh* elements, denoted by *eh*1, *eh*2, . . . , *ehmn* . The influence of a set of elements belonging to a component, on any elements from another component, can be represented as a priority vector by applying pair-wise comparisons in the same way as the AHP.

These priority vectors are grouped and located in appropriate positions in a super matrix based on the flow of influence from one component to another component, or from a component to itself as in the loop. A standard form of a super matrix is as follows:

$$
W = \begin{array}{c} \\ c_1 \\ \\ \\ c_2 \\ \vdots \\ \\ c_N \\ \\ \end{array}
\begin{array}{c}
\begin{array}{ccc} c_1 & c_2 & c_N \end{array} \\
\begin{array}{ccc} e_{11}e_{12}\cdots e_{1n_1} & e_{21}e_{22}\cdots e_{2n_2} & e_{N1}e_{N2}\cdots e_{Nn_N} \end{array} \\
\begin{bmatrix} W_{11} & W_{12} & W_{1N} \\ \vdots & \vdots & \vdots \\ W_{21} & W_{22} & W_{2N} \\ \vdots & \vdots & \vdots \\ W_{N1} & W_{N2} & W_{NN} \end{bmatrix}
\end{array}
\begin{array}{l} e_{11} \\ e_{12} \\ \vdots \\ e_{1n_1} \\ e_{21} \\ e_{22} \\ \vdots \\ e_{2n_2} \\ e_{N1} \\ e_{N2} \\ \vdots \\ e_{Nn_N} \end{array}
$$

Wij is the principal eigenvector of the influence of the elements in the *j*th component to the *i*th component. In addition, if the *j*th component has no influence on the *j*th component, then *Wij* = 0. The form of the super

matrix relies on the variety of its structure. For instance, if we assume that there are two cases involve four components with different structures as shown in Fig. 2.

$$w_a = \begin{array}{c} \\ C_1 \\ C_2 \\ C_3 \\ C_4 \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & C_3 & C_4 \end{array} \\ \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \end{pmatrix} \end{array}, \quad w_b = \begin{array}{c} \\ C_1 \\ C_2 \\ C_3 \\ C_4 \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & C_3 & C_4 \end{array} \\ \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix} \end{array}$$

The eigenvector for an element in each column is multiplied by all the elements from the first component to the last component of that column. In this way, the component in each column of the super matrix is weighted. The weighted super matrix should be raised to the power of 2k + 1 (k is an arbitrarily large number) in order to converge the importance weights (Saaty 1999), because raising a matrix to exponential powers gives the long-term relative influences of the elements on each other.

Step 4. Selection of the best alternatives: If super matrix includes only components that are interrelated, additional calculations must be made to obtain the overall priorities of the alternatives. Then the alternative with the highest weight should be selected as the best.

3. Proposed model to determine priorities of strategies in medical equipment producer industry

In this essay, SWOT and ANP analysis were applied to determine the priority of strategies. Medical equipment producer industry is addressed as a case study. Initially, a team of experts attempted to recognize controllable and uncontrollable by-factors affecting organization success by analysis of internal and external environment. Determined by-factors have strategic importance. SWOT matrix and alternative strategies are determined by SWOT by-factors. Table number 2 shows that organization has four strategies. The concept of SO strategy is to take advantage of opportunities by using the organization strengths. WO strategy utilizes environmental opportunities by considering organization weaknesses. ST strategy concerns reducing or eliminating the effect of environmental threats by applying organization strengths and finally WT strategy considers organization weaknesses and attempts to reduce the effect of environmental threats. In this essay, SWOT analysis was applied to determine the priority of proposed strategies and choose the best organization strategy. The population of this essay are ten experts in SOPA company (medical equipment producer) who are familiar with the operations and the external and internal environment of related industry. The whole data was collected by consensus among experts.

Sub-criteria and strategic choices based on SWOT are shown in Table2.

1.3. Analysis of model applied in this study

Step 1: Initially, problem is organized as ANP model. This model consists of four levels. (figure 3)

Step 2: Supposing absence mutual dependence between SWOT's main factors, dual scales matrix of main factors is formed by experts using scale of 1 to 9 (table number 3). Dual scales matrix is analyzed using super decisions software and weight vector form.

In exercising dual scales, matrices' consistency must be considered. A=$[a_{ij}]$ Matrix was considered as consistence if rate of $a_{ik} \times a_{kj}=a_{ij}$ show inconsistency lower than 0/1 which is acceptable in dual scales [3].

Step 3: In this step mutual dependence between main factors is determined by examining effect of each factor on other factors by using dual scales matrices. Mutual dependence between main factors is formed after analysis of internal and external environment which is indicated in 1-b figure. For example "To what extends relative importance of weaknesses is in comparison to opportunities for controlling of strengths?" Whereas opportunities are solely affected by strengths, no dual comparative matrix forms for opportunities. (table 4,5,6)

Other steps namely step 3, 4, and 5 etc. might be exercised by two methods:

First method: In addition to using super-matrix method for accounting final weights, especially when number of factors having internal relations is low, it might be allowed to use matrix operation. This method is practical and also details of process are specified in matrix method.

Step 4: In this step, mutual dependence weights of main factors are produced by dependence matrix of main factors (in step 3) multiply by relative importance of main factors, come after normalization. It seems, there is a marked difference between resultant factors' weights and mutual dependence weight of factors.

$$\begin{pmatrix} 1 & 0.8 & 1 & 0.857 \\ 0.643 & 1 & 0 & 0.143 \\ 0.255 & 0 & 1 & 0 \\ 0.101 & 0.2 & 0 & 1 \end{pmatrix} \times \begin{pmatrix} 0.476 \\ 0.252 \\ 0.155 \\ 0.117 \end{pmatrix} = \begin{pmatrix} 0.47 \\ 0.29 \\ 0.128 \\ 0.108 \end{pmatrix}$$

Step 5: In this step, relative importance of SWOT's by-factors is produced by using dual scales. The results are indicated in table number 7.

Step 6: In this step, totality weights of WG by-factors are produced by weights of main factors (produced in step 4) multiply by relative weights (table number 7). Totality weights vector is shown in table number 7.

Step 7: In this step, the priorities of alternative strategies are accounted by dual comparative matrix and by considering each SWOT by-factors. Due to the great number of them, two instances of them are shown in table 8 and 9 and the rest of them are collected in table number 10.

Step 8: At the end, strategy's final weights are produced by following formula:

$$W_A = \begin{bmatrix} SO \\ WO \\ ST \\ WT \end{bmatrix} = \mathbf{w} \times w_G = \begin{bmatrix} 0/35 \\ 0/187 \\ 0/344 \\ 0/12 \end{bmatrix}$$

In this formula, W_A **is** considered as strategy's final weights, W is the level of strategy priority considering each SWOT's by-factors and w_G regarded as totality weights of by-factors. Regarding produced weights, SO strategy has the highest weight and is chosen as the best strategy. Therefore, the organization has to work on implementing the use of strengths financial vigor for developing markets and entering other country's markets strategy.

Second method: In this method super decision software is used to produce super-matrix. These matrixes include weighed super-matrix and limited super-matrix which is applied to reach convergence of weights' importance. (table 11, 12)

In Computation section, there is a choice which is called Full Report. Clicking on Full Report provides us a comprehensive report with HTML format. Ranking of strategy choices might be observed in this report.

It seems, ranking of strategies is done the same way as which is implemented in matrix method, namely WO< ST < SO <WT. (table 13)

4. Conclusion

Results show that, strategy's priorities in ANP method are based on two produced methods namely matrix and super-matrix methods, as follow:

1. Using strength financial vigor for developing markets and entering markets of neighbor countries (SO)

2. Participating in exhibitions to be introduced to other countries (WO)

3. Superseding foreign competitor's products to strengthen organization commercial label (ST)

4. Dealing some units of company to Chinese company (WT)

Goals of SWOT analysis are to relate weaknesses and strengths of a company to opportunities and threats in the industry. By specifying weaknesses, strengths, opportunities and threats, organization is allowed to formulate strategies based on strengths, eliminating of weaknesses and taking opportunities to encounter threats. In this essay, ANP method is used to consider dependence between factors Also because a reader has an accurate understanding about that, the method has been implemented in two ways namely matrix (manual) and super-matrix (software). As it can be seen, the results are the same.

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Figures and Tables:

Table1: Pair-wise comparison scale (Saaty 1999)

Numerical value(s)	Option
9	Extremely strong
7	Very strong
5	Strong
3	Marginally strong
1	Equal
،4 ،2 8 ،6	Intermediate values to reflect fuzzy inputs

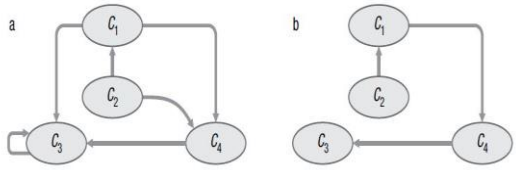

Figure 2: Structures of two cases

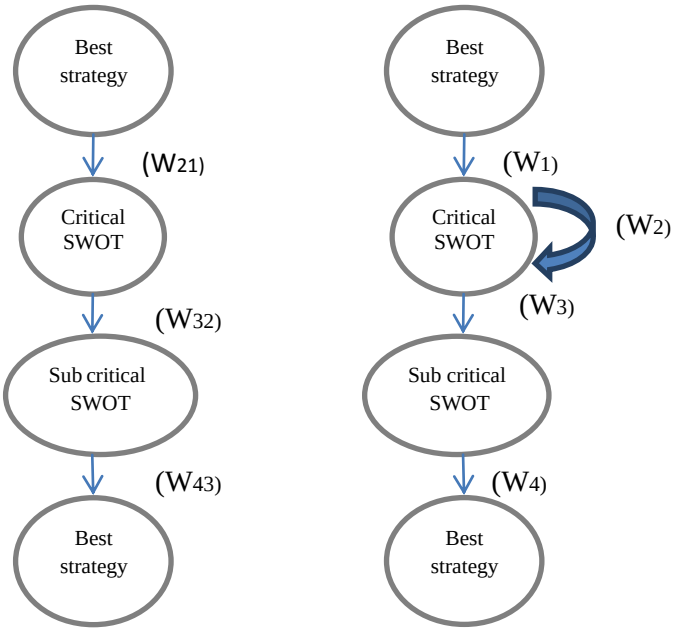

Fig a: AHP-SWOT

Fig b: ANP-SWOT

Figure 1: The difference between a hierarchy (a) and a network (b)

Table 2: SWOT Matrix

Weaknesses: W1 : Lack of advertising W2: Weaknesses in the use of IT W3 : Problems in the supply of raw materials W4 : Lack of long-term goals W5 : Not use of new technology	Strengths: S1 : Strong capital and funding S2 : Market Leader (Leader of Distinction) S3 : Variety of Products S4 : More experience in the industry (history) S5 : Powerful distribution system S6 : Export S7 : Powerful R & D unit	SWOT Matrix
Conservative strategy(WO) Participating in exhibitions to be introduced to other countries	**Offensive strategy(SO)** Using strength financial vigor for developing markets and entering markets of neighbor countries	Opportunities : O1 : Market Development O2 : Potential for more export O3 : Threat the competitor O4 : Acquire new markets O5 : Increased rates of Disease O6 : Increased levels of public health
Defensive strategy (WT) Dealing some units of company to other company	**Competitive Strategy(ST)** Superseding foreign competitor's products to strengthen organization commercial label	Threats : T1 : Increased imports T2 : Inflation T3 : Government laws T4 : Increased in energy price T5 : Foreign exchange rate changes T6: Financial sanctions

Table 3: Paired comparison matrix factors and the relative importance of each factor

Main Factor	S	W	O	T	Relative Significance
S	1	2	4	3	0/476
W	0.5	1	2	2	0/252
O	0.25	0.5	1	2	0/155
T	0.334	0.5	0.5	1	./117

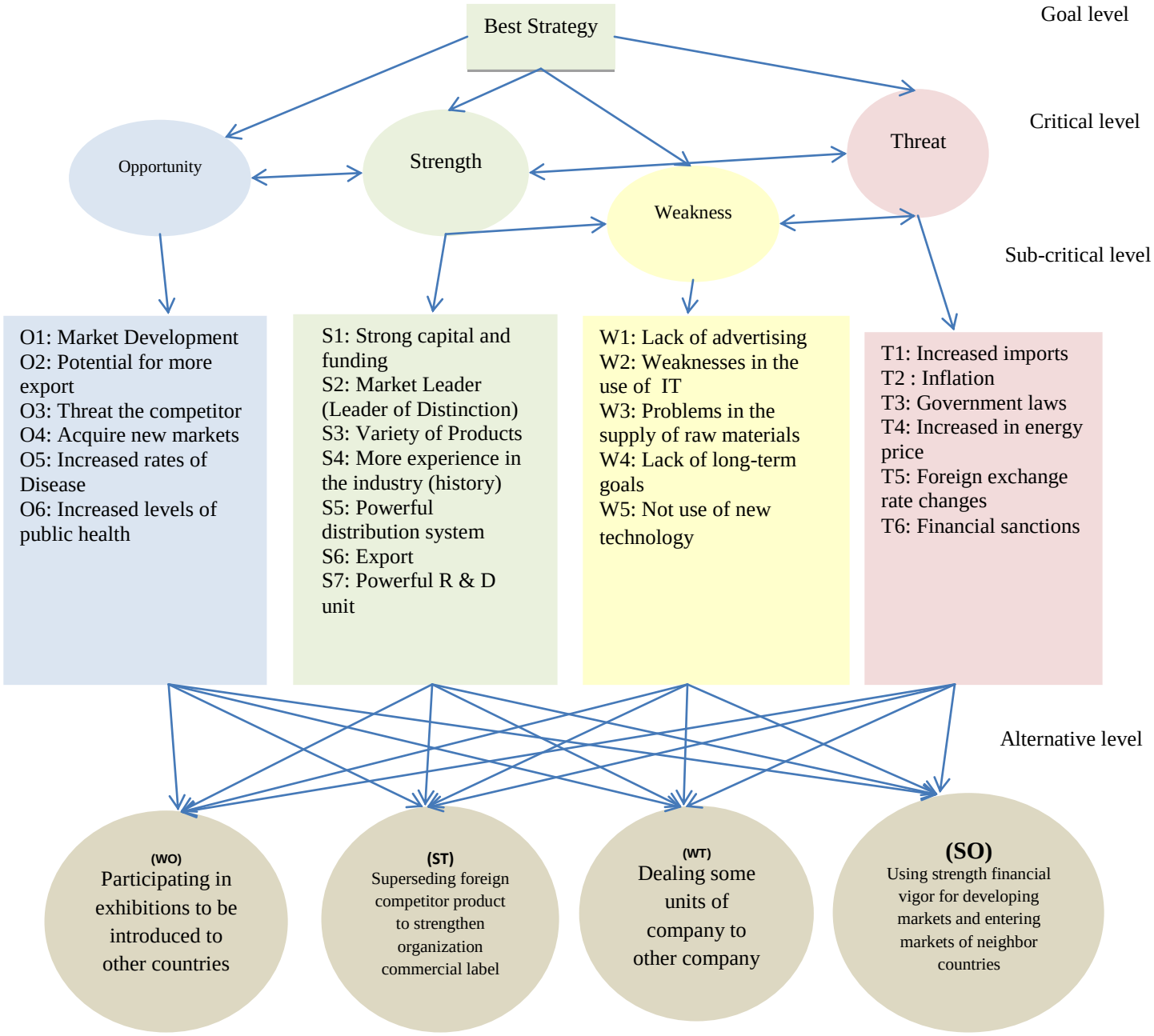

Figure 3: ANP, SWOT model

Table 4: Paired comparison matrix factors and the relative importance of each factor

Strength	W	O	T	Relative Significance
W	1	4	4	0.643
O	0.25	1	4	0.255
T	0.25	0.25	1	0.101

Table 5: Paired comparison matrix factors and the relative importance of each factor

Weakness	S	T	Relative Significance
S	1	4	0.8
T	0.25	1	0.2

Table 6: Paired comparison matrix factors and the relative importance of each factor

Threat	S	W	Relative Significance
S	1	6	0.857
W	0.166	1	0.143

Table 7: The total weight of the SWOT sub-factors

The total weight of the sub-factors	Relative significance of sub factor	SWOT-sub factor	Relative significance of main factor	SWOT Factors
0/036	0770/	S1 : Strong capital and funding	0.47	Strength
0/054	1150/	S2 : Market Leader (Leader of Distinction (		
0/054	1150/	S3 : Variety of Products		
0/109	2310/	S4 : More experience in the industry (history)		
0/109	2310/	S5 : Powerful distribution system		
0/054	1150/	S6 : Export		
0/054	1150/	S7 : Powerful R & D unit		
0/131	4520/	W1 : Lack of advertising	0.29	Weakness
0/031	1070/	W2 : Weaknesses in the use of IT		
0/079	2740/	W3 : Problems in the supply of raw materials		
0/017	0.06	W4 : Lack of long-term goals		
0/031	0.107	W5 : Not use of new technology		
0/012	0.088	O1 : Market development	0.138	Opportunities
0/046	0.337	O2 : Potential for more exports		
0/046	0.337	O3 : Threat the competitor		
0/027	0.198	O4 : Increased rates of Disease		
0/006	0.041	O5 : Increased levels of public health		
0/034	3180/	T1 : Increased imports	0.108	Threats
0/034	3180/	T2 : Inflation		
0/015	1370/	T3 : Government laws		
0/015	1370/	T4 : Increased in energy price		
0/006	060/	T5 : Foreign exchange rate changes		
0/003	030/	T6: Financial Sanctions		

Table 8. Matrix of paired comparisons for the ranking of the factors

S1 : Strong capital and funding	SO	WO	ST	WT	RS
SO	1	3	5	7	0/558
WO		1	3	7	0/279
ST			1	3	0/113
WT				1	0/05

Table 9. Matrix of paired comparisons for the ranking of the factors

O3 : Threat the competitor	SO	WO	ST	WT	RS
SO	1	3	1	5	0/39
WO		1	$\frac{1}{3}$	3	0/152
ST			1	5	0/39
WT				1	0/068

Table 10. Relative weight

Threats						Opportunities					Weaknesses					Strengths							Matrix
T6	T5	T4	T3	T2	T1	O5	O4	O3	O2	O!	W5	W4	W3	W2	W1	S7	S6	S5	S4	S3	S2	S1	
0/424	0/522	0/249	0/25	0/2	0/5	0/657	0/56	0/39	/528	/528	0/522	0/625	0/417	0/21	0/375	0/395	0/528	0/125	0/167	0/423	1590/	0/558	**(SO) Strategy**
0/402	0/2	0/095	0/25	0/078	0/167	0/076	0/095	0/152	0/21	0/21	0/2	0/125	0/083	0/528	0/125	0/395	0/21	0/125	0/167	0/104	3950/	0/279	**(WO) Strategy**
0/085	0/078	0/095	0/25	0/2	0/167	0/191	0/249	0/39	0/21	0/21	0/2	0/125	0/417	0/21	0/375	0/163	0/21	0/625	0/5	0/423	3780/	0/113	**(ST) Strategy**
0/09	0/2	0/56	0/25	0/522	0/167	0/076	0/095	0/068	0/052	0/052	0/078	0/125	0/083	0/052	0/125	0/047	0/052	0/125	0/167	0/051	0/068	0/05	**(WT) Strategy**

Table 11. Weighted Super matrix

	SO	ST	WO	WT	S1	S2	S3	S4	S5	S6	S7	W1	W2	W3	W4	W5	O1	O2	O3	O4	O5	T1	T2	T3	T4	T5	T6
SO	0	0	0	0	0.2790	0.1594	0.4225	0.1666	0.125	0.5281	0.3950	0.1875	0.21	0.4166	0.625	0.5222	0.26406	0.5281	0.3898	0.5595	0.656	0.25	0.1998	0.25	0.2494	0.5222	0.4239
ST	0	0	0	0	0.0565	0.3775	0.4225	0.500	0.625	0.2100	0.1626	0.1875	0.21	0.4166	0.125	0.1998	0.105	0.210	0.3898	0.2494	0.191	0.083	0.1998	0.25	0.0954	0.0780	0.0847
WO	0	0	0	0	0.1394	0.3946	0.1043	0.1666	0.125	0.2100	0.3950	0.0625	0.5281	0.0833	0.125	0.1998	0.105	0.210	0.1523	0.0954	0.075	0.083	0.0780	0.25	0.0954	0.1998	0.4015
WT	0	0	0	0	0.0250	0.0684	0.0506	0.1666	0.125	0.0518	0.0473	0.0625	0.0518	0.0833	0.125	0.0780	0.0259	0.0518	0.0679	0.0954	0.075	0.083	0.5222	0.25	0.5595	0.1998	0.4015
S1	0	0	0	0	0.0250	0.0684	0.0506	0.1666	0.125	0.0518	0.0473	0.0625	0.0518	0.0833	0.125	0.0780	0.0259	0.0518	0.0679	0.0954	0.075	0.083	0.5222	0.25	0.5595	0.1998	0.4015
S2	0	0	0	0	0.1150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S3	0	0	0	0	0.0770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S4	0	0	0	0	0.0770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S5	0	0	0	0	0.0383	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S6	0	0	0	0	0.0383	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S7	0	0	0	0	0.0770	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W1	0	0	0	0	0.0770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W2	0	0	0	0	0	0	0	0	0	0	0	0.2260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W3	0	0	0	0	0	0	0	0	0	0	0	0.0535	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W4	0	0	0	0	0	0	0	0	0	0	0	0.1370	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W5	0	0	0	0	0	0	0	0	0	0	0	0.0300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O1	0	0	0	0	0	0	0	0	0	0	0	0.0535	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O2	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0.04396	0	0	0	0	0	0	0	0	0	0
O3	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0.04396	0	0	0	0	0	0	0	0	0	0
O4	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0.04396	0		0	0	0	0	0	0	0	0
O5	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0.09890	0	0	0	0	0	0	0	0	0	0
T1	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0.09890	0	0	0	0	0	0	0	0	0	0
T2	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0.1590	0	0	0	0	0
T3	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0.1590	0	0	0	0	0
T4	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0.0685	0	0	0	0	0
T5	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0.0680	0	0	0	0	0
T6	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0.0300	0	0	0	0	0

Table 12. limited Super matrix

	SO	ST	WO	WT	S1	S2	S3	S4	S5	S6	S7	W1	W2	W3	W4	W5	O1	O2	O3	O4	O5	T1	T2	T3	T4	T5	T6
SO	0	0	0	0	0.31853	0	0	0	0	0	0	0.31477	0	0	0	0	0	0	0	0	0	0.25553	0	0	0	0	0
ST	0	0	0	0	0.28002	0	0	0	0	0	0	0.25027	0	0	0	0	0	0	0	0	0	0.14460	0	0	0	0	0
WO	0	0	0	0	0.22461	0	0	0	0	0	0	0.13647	0	0	0	0	0	0	0	0	0	0.12270	0	0	0	0	0
WT	0	0	0	0	0.06176	0	0	0	0	0	0	0.07249	0	0	0	0	0	0	0	0	0	0.31817	0	0	0	0	0
S1	0	0	0	0	0.02649	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S2	0	0	0	0	0.01773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S3	0	0	0	0	0.01773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S4	0	0	0	0	0.00883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S5	0	0	0	0	0.00883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S6	0	0	0	0	0.01773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S7	0	0	0	0	0.01773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W1	0	0	0	0	0	0	0	0	0	0	0	0.10215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W2	0	0	0	0	0	0	0	0	0	0	0	0.02418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W3	0	0	0	0	0	0	0	0	0	0	0	0.06192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W4	0	0	0	0	0	0	0	0	0	0	0	0.01356	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W5	0	0	0	0	0	0	0	0	0	0	0	0.02418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05056	0	0	0	0	0
T2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05056	0	0	0	0	0
T3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02178	0	0	0	0	0
T4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02178	0	0	0	0	0
T5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00954	0	0	0	0	0
T6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00477	0	0	0	0	0

Table 13. Ranking Options

Graphic	Alternatives	Total	Normal	Ideal	Ranking
	SO- Market Development	0.0876	0.0375	0.1900	9
	SO- Market Development	0.3123	0.1336	0.6775	4
	SO- Market Development	0.4610	0.1973	1.0000	1
	ST- superseding foreign competitor product	0.2979	0.1275	0.6462	5
	ST- superseding foreign competitor product	0.4052	0.1734	0.8791	2
	WO- participating in exhibition	0.0421	0.0180	0.0912	10
	WO- participating in exhibitions	0.1354	0.0579	0.2937	7
	WO- participating in exhibitions	0.3250	0.1391	0.7051	3
	WT- dealing some units of company	0.1810	0.0774	0.3926	6
	WT- dealing some units of company	0.0894	0.0382	0.1939	8